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Research Memorandum 68-6

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**DEVELOPMENT OF NEW FORMS OF COMBAT TEST
FOR ACB--RESEARCH DESIGN AND
DATA COLLECTION**

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APRIL 1968

79 12 18 317

Army Project Number
2J024701A722

Combat Performance b-00

(9) Research Memorandum 68-6

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(14) BEERL-RM-68-6

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(11) April 1968

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DEVELOPMENT OF NEW FORMS OF COMBAT TEST FOR ACB--
RESEARCH DESIGN AND DATA COLLECTION

BACKGROUND AND PURPOSE OF THE RESEARCH

Shortly after World War II, the Army initiated research on the identification of abilities that are related to effective performance in combat. Research experience accumulated over this post-World War II period, during the Korean War, and in subsequent maneuvers has led to the conclusion that the best results in the prediction of combat potential would come through the measurement of personality, motivation, interest, and attitudinal factors, in addition to the measurement of technical skills and abilities.

Research to develop predictors of combat performance was continued in Project Riley--initiated at Fort Riley, Kansas in 1955--and led to identification of certain factors that were differentially valid for prediction of performance in combat jobs. Results of these early research efforts culminated in the development of two tests that were combined with other tests in the Army Classification Battery to establish two new combat aptitude areas for use in the assignment of recruits to combat military occupational specialties (MOS):

The Classification Inventory (CI-1 or -2), a 125-item self-description personality measure, derived from an item pool validated against a Korean combat criterion.

The General Information Test (GIT-1 or -2), a 50-item test which measures knowledge of general outdoor masculine activities, derived from an item pool validated against a maneuver criterion in Germany.

Recently, renewed emphasis has been directed to research on combat effectiveness. Two significant considerations led to this reemphasis: First, since the operational measures are based on research completed some 12 or 15 years ago, there is a question about their continued operational validity. The subject matter content of the informational items may have been affected with the passage of time; repeated operational use may have compromised the measures; and the nature of combat requirements--the criterion--may have undergone modification over the years. Second, the current posture of the Army force in combat in Vietnam, in combat readiness in Germany and Korea, and in training within the continental United States, permits the validation of combat selection measures against an actual combat criterion, and at the same time provides opportunity for analysis of differences between different criterion situations and for determination of differing psychological requirements for effective performance in the different situations.

The present report describes the research design, instrument development, general statistical analyses, and data collection requirements of the current combat performance research program.

THE RESEARCH PLAN

The present research aims to develop measures for improved identification of enlisted men with potential for developing into good combat soldiers, to establish within these measures differential predictive validity between combat and noncombat jobs; and to expand knowledge of the psychological requirements of combat by identifying measurable personal characteristics which are relevant in the actual combat environment but less relevant in the combat-ready or CONUS environment, or vice versa.

DEVELOPMENT OF EXPERIMENTAL ITEM POOLS

1. Self-descriptive personality-type items of the operational Classification Inventory (125 items) were classified into ten scale dimensions based on the consensus of five psychologists making independent judgments. The judgments were made from a study of the item content and also from a study of an inter-item correlation matrix. The dimensions are as follows:

- Emotional stability
- Masculinity
- Leadership
- Social responsibility
- Energy
- Independence
- Acceptance of discipline
- Decisiveness
- Sociability
- Combat orientation

2. A supplemental pool of 159 items designed to cover the same dimensions was added to the original 125 items to form a new pool of 284 items (CI-5X). Some of the additional items were written by BESRL psychologists, while others came from unused items in the files of BESRL. Final item selection was made by a team of psychologists.

3. Interest in outdoor and masculine-type activities are indirectly measured in the operational General Information Test (100 items in two 50-item forms). Items in this test were reviewed and classified by consensus into four major categories:

- Team sports
- Individual sports
- Hobbies and pastimes
- Military information

These items were also reviewed for timeliness, and 14 of the original items were discarded. The remaining 86 items, supplemented by 64 additional items of the same type written by BESRL psychologists, were assembled as an experimental item pool (GIT-5X).

REVALIDATION OF OPERATIONAL TESTS

In addition to the experimental item pools described above, all measures in the current Army Classification Battery, the Driver Aptitude Battery, and the Leadership Potential Ratings (peer ratings obtained in the fifth week of Basic Combat Training) will be examined, both in terms of their predictive value for performance in the combat MOS and in terms of their differential prediction value for the noncombat MOS.

DEVELOPMENT OF CRITERION MEASUREMENT

The criterion against which the predictor tests will be validated is the evaluation of actual performance on the military assignment. In the case of individuals in combat MOS, ratings will be obtained independently from four military superiors (in Infantry, the Company Commander, Platoon Leader, Squad Leader, and Fire Team Leader; in the other combat MOS, superiors in equivalent positions). In the case of individuals in non-combat MOS, ratings will be obtained independently from three individuals who are in a position to evaluate the individual's work performance--the immediate superior who directly supervises and assigns work to the enlisted man, and two other individuals usually to be designated by the immediate supervisor.

Ratings are to be based on observed performance of two months or longer. For raters in the combat MOS, two evaluation scales are used. The first is an 18-point scale from "poorest" to "best" combat (or combat-type) performance in comparison with others of the same grade, MOS, and approximately equal Army experience. The second is a 7-point descriptive scale from "not a combat soldier" to "a truly outstanding combat soldier". Ratings will be obtained on a standard rating form (Combat Effectiveness Evaluation Form, PT 4632 or PT 4632-R2. For ratees in the noncombat MOS, three evaluation scales are used, each on a 9-point scale from "poorest" to "best". Ratings are obtained on "cooperation with others on the job", "how well the job is performed", and "estimated performance in the next higher grade". Ratings will be obtained on a standard rating form: BESRL Enlisted Evaluation Form (PT 4656) or Enlisted MOS Evaluation Form (PT 4656-R).

EXPERIMENTAL SAMPLE

Predictor and criterion data will be collected across a spectrum of environmental conditions, ranging from actual combat in South Vietnam (two samples, Spring 1967 and Winter 1968), through combat-ready (Europe and South Korea), to arduous environmental conditions (Alaska).

On the MOS dimension, the sample will be subdivided into MOS that are directly combat (initial two-digits: 11, 12, 13, 15, 16, 17) MOS in close support of actual combat operations (initial two or three characters: 31B, 36K, 62A, 63A, B; 67A to Z; 91A, B), and noncombat or base support MOS (initial two or three characters: 05, 26, 31, less (31B); 36, (less 36K); 45, 51, 62, 63, 64, 68, 70, 71, 72, 76, 82, 91C to Z),

In schematic form, the desired sample sizes are:

	Vietnam		Europe	Korea	Alaska
	Spring 67	Winter 68			
Combat	750	1750	1000	300	200
Close Support	1000	2300	1500	900	200
Base Support	400	200	1500	900	

STATISTICAL PLANNING

Statistical analyses will be conducted for three major research objectives:

1. Development of new measures for inclusions in the Army Classification Battery. Instruments will be developed which measure personal characteristics shown to be related to effective performance in the combat MOS. These measures will be used to identify combat potential among recruits and, in conjunction with other measures in the ACB, in the initial classification and assignment of recruits.

2. Differential predictability. Personal characteristics are to be identified which are uniquely related to effective combat performance, in contrast to those that are related to general competence or effectiveness in a variety of military assignments, in order to maximize effectiveness in the differential classification of recruits.

3. Criterion equivalence. The degree to which performance requirements are influenced by the external situation. Are the personal requirements for effective performance in the combat MOS, for example, the same for the combat theater (Vietnam) as for the combat-ready theater (Germany-Korea) and for the arduous environment (Alaska)?

The basic statistical design, showing the separate within-sample and cross-sample comparisons directed at the objectives outlined above, is depicted schematically in Figure 1. The details of specific analysis are as follows:

The initial statistical analyses and the development of new operational tests will be carried out on the sample of cases for which criterion data were collected in Vietnam in the spring 1967. These analyses, which will serve as the prototype for all other separate within-theater analyses (Vietnam, Winter 1968; Korea; Germany; Alaska) are as follows:

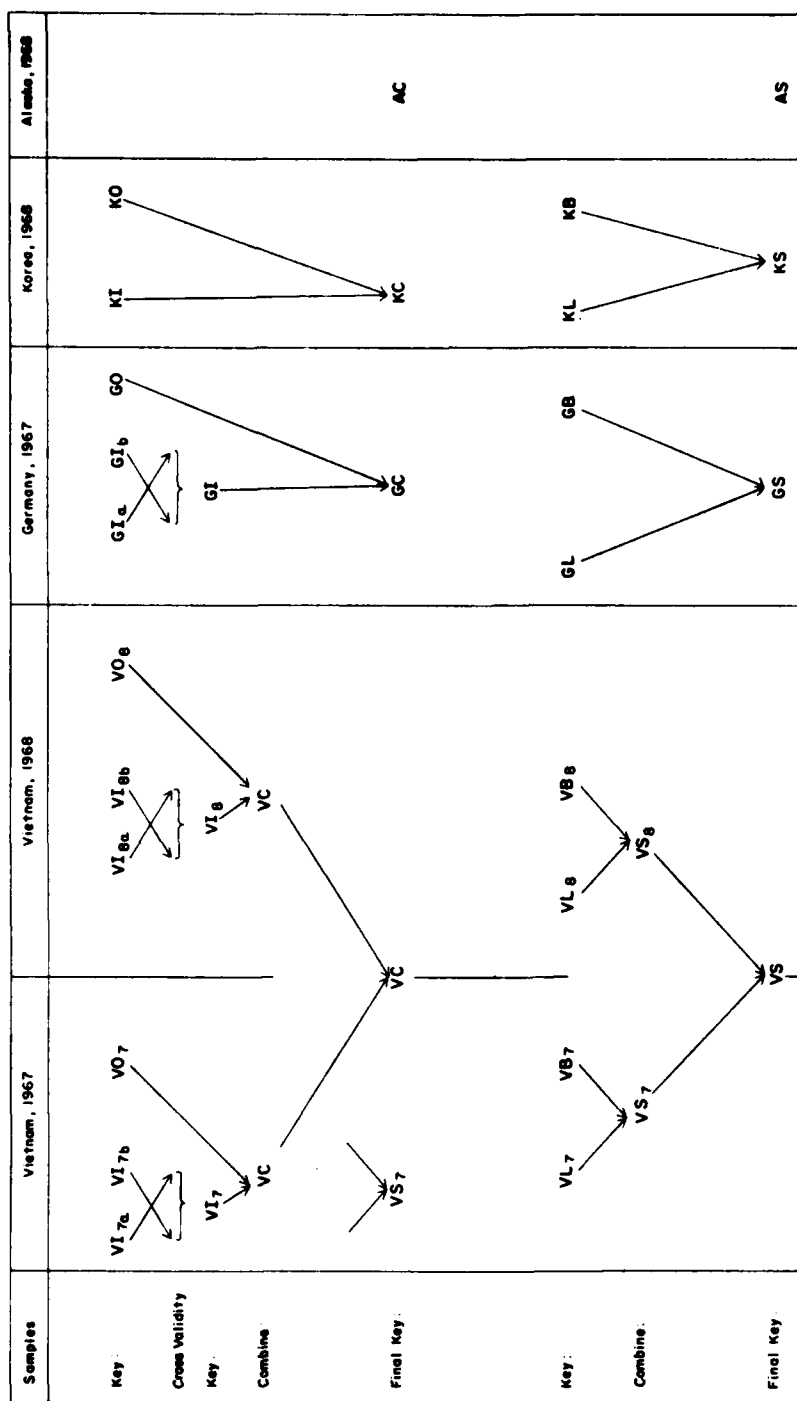
1. Item difficulties and validities for each item in the experimental item pools will be established on each of the two equivalent halves of the Infantry subsample. Keys will be developed for each of the two groups and validated on the other group to obtain unbiased validity estimates. Thereafter, a final key will be developed from data on the total Infantry subsample. Its validity will be estimated from the validities of the two Infantry subsamples.

2. A second key will be developed on the remaining combat MOS. (In other samples where number of cases permit, this group will be further divided into the Armor, Artillery, and Combat Engineer subgroups). For differential validity purposes, this key will be validated against the Infantry sample, and the key made on the Infantry sample will be validated against this sample. Comparison of these validity coefficients with the direct validity estimates will establish whether performance within the combat theater is differentially predictable between the Infantry MOS and other combat MOS.

3. Another key will be developed for the close support noncombat MOS. For differential validity, this key will be validated against the criterion scores for the combat samples, and the keys developed for the combat samples will be validated against the criterion for the close support noncombat MOS sample. Results will indicate whether performance in the combat theater is differentially predictable between combat MOS assignments and close support MOS assignments.

4. Finally, a key will be developed for the noncombat base support MOS (as defined above). As before, validity estimates will be obtained for the base support MOS criterion. For differential validity, the key will then be validated on the combat MOS criteria, with the combat MOS keys validated on the base support criterion. These validity coefficients compared with those for the close support MOS sample will show whether degree of relationship between these MOS and those of the combat MOS is reflected in the separate validity coefficients.

The analyses outlined above will be repeated on a second Vietnam sample (for which criterion data were collected in the winter of 1968).



LEGEND

Samples - Geographic	Occupational Samples
V7 = Vietnam 1967	I = Infantry
V8 = Vietnam 1968	O = Other Combat (Armer. Artillery, Combat Engineer)
G = Germany 1967	L = Close Combat Support
K = Korea 1968	B = Base Support
A = Alaska 1968	C = All Combat
	S = All Support

Figure 1. Combat Performance Research Statistical Analyses Plan

Keys developed in this second sample will be crossed with the appropriate subsamples described above, and conversely. From these results, which will provide more stable estimates of the predictive efficiency of subsequent performance in the separate items in the experimental item pools, final experimental tests will be developed. Results for these experimental tests will be combined with results for all the tests in the operational Army Classification Battery for the Vietnam combat MOS samples and optimum regression weights determined.

Similar analyses will then be conducted for the samples in the various combat environmental conditions--combat-ready (South Korea and Germany) and arduous living conditions (Alaska). Because of the limited number of cases in the Korean and Alaskan groups, keys will be developed only for the total occupational subsamples, and unbiased validity estimates of the subsamples will not be obtained. Finally, factor keys will be developed for each of the experimental tests from the intercorrelation matrix of item responses.

Intercorrelations among the keys developed for each of these samples and from the factor keys will be determined on the basis of the items selected for each key. Analysis of this intercorrelation matrix will show the degree of similarity of personal characteristics that are related to success in one situation in contrast to the other situations, and thus the degree of criterion comparability across the situations. These results will provide basic information for the better understanding of the nature of psychological requirements of combat. To the extent that the required psychological characteristics within the individual are subject to modification through training, motivation, or orientation programs, they provide a basis for developing better preparation and orientation of men prior to their assignment to the actual combat situation.

DATA COLLECTION

COLLECTION OF EXPERIMENTAL PREDICTOR DATA

The experimental item pools (CI-5X and GIT-5X) were arranged in standard test booklet format, with responses entered on a specially designed DIGITEK answer sheet. To meet conditions of experimental control, the following restraints were observed:

1. Tests were administered during Reception Station processing, as is done with the Army Classification Battery. Since some of the test items are sensitive to military experience, arrangements were made for testing as early in Reception Station processing as feasible; that is, during the first or second day of Army experience.

2. Tests were administered in a single four-hour session during the regular Reception Station processing routine. Testing was carried out in accordance with standard administration procedures.

3. To assure a geographical spread of experimental subjects, tests were administered at eight Reception Stations throughout the United States. (Forts Benning, Bliss, Dix, Jackson, Knox, Leonard Wood, Ord, and Polk).

4. Quotas ranging from 3,300 to 7,500 were assigned to individual Reception Stations on the basis of recruit flow. A total of 32,000 men were tested.

5. Within practical limits, all entering personnel, both volunteer and inductee, were tested from the inception of the program until the specified quotas were met. This testing was carried out in April and May, 1966.

COLLECTION OF OPERATIONAL PERSONNEL DATA

Training Card One and Training Card Two, as defined in Army Regulation AR 614-203, were collected for each individual tested. Included in these records are data on physical profile, preferred and recommended training, education (both level attained and courses taken), AFQT score, Army Classification Battery scores, and specialized test scores.

Leadership Potential Ratings ("Buddy Ratings"), as defined in DA Pamphlet 611-205, were collected, insofar as these were available, for the individuals tested.

COLLECTION OF CRITERION DATA

Criterion data on the initial two samples (Vietnam, Spring 1967; and Germany, Autumn 1967) were collected by teams of BESRL research scientists in field visits to the units concerned. These field visits served two purposes; first, to provide insights into the nature of combat and combat-ready situations and the conditions represented in evaluations of job performance by superiors, and second, to clarify the data collection requirements and instructions for subsequent criterion data collection by mail on the remaining samples. Ratings on approximately 6000 ratees were collected during field visits and on approximately 8000 ratees by mail procedures (Vietnam, Korea, Alaska, Winter 1968).

Procedures followed in the collection of criterion ratings were:

Identification of sample and location. Names and service numbers of individuals tested at the Reception Stations were entered on a master computer tape. This tape was then matched against the master personnel tape

at appropriate Army Headquarters to identify the portions of the sample down to Company or equivalent level located in the separate geographical areas:

Headquarters, U. S. Army Pacific for the Vietnam sample and the Korean sample.

Headquarters, U. S. Army Europe for the German sample.

Headquarters, U. S. Army Alaska for the Alaskan sample.

Preparation of Criterion Rating Forms. Criterion rating forms were prepared for each ratee, in quadruplicate in the case of the Combat Effectiveness Evaluation Form and in triplicate in the case of Enlisted MOS Evaluation Form (one for each rater). Tabulating equipment and either tabular rating forms or continuous-form gummed labels were used. The information printed on the form included ratee's name, service number, pay grade, MOS, organization, and location.

Administration of Rating Program. For the field data collection, BESRL scientists visited each major installation within the theater area and, in collaboration with a responsible project officer at battalion or equivalent organizational level, developed procedures for collecting the required performance ratings. Provisions were made for completion and forwarding of the ratings in privacy, and deadlines were established for completion and return of the forms.

On the basis of field experience, mail procedures were developed for the remaining criterion data collection effort. Required rating materials were mailed to company or equivalent levels. These were accompanied by a Department of Army letter outlining the program and providing comprehensive instructions for meeting the program requirements. Arrangements were made for completion and return of ratings in privacy but with administrative control to assure their return within deadline limits.

SUMMARY

The samples, variables, data collection procedures, and general research design of a longitudinal combat performance study have been described. Results of validation analyses conducted on combat effectiveness, utilizing the samples and variables described, will be published later.

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